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July 27, 1970

Dr. F. H. C. Crick
MRC Laboratory of Molecular Biology
University Postgraduate Medical School
Hills Road
Cambridge, CB2 2QH
ENGLAND

Dear Doctor Crick:

Thank you for your letter and the copy of your article in Nature. I am glad to be the unwitting stimulus for this article for it is a useful historical statement and a corrective to the general debasement of your ideas. I, however, have been aware that RNA to DNA was not a forbidden mode of information transfer. In fact, Dick Matthews was working in my lab in 1965 when you visited Khorana here. Matthews explicitly asked you about this then.

However, after reading your article (and rereading it), I still wonder why finding the unknown transfers would be more disturbing than finding the special transfers. In fact, with the presently unresolved questions of embryogenesis, long-term memory, and the immune response, I expect the unknown transfers do exist. It seems to me that the sequence hypothesis is the really crucial one for the present day molecular biology. And, to me, violation of this would be necessary for a real alteration in our basic thinking. Two possibilities, moreover, already exist for this. One is scrapie which may represent some novel three-dimensional transfer, but, probably, is more trivially an autocatalytic toxin. A second is Sonneborn's Paramecium monsters produced by cortical fusion. These seem a two-dimensional problem and perhaps could still be encompassed in a one-dimensional tape theory, perhaps with protein having a major role.

Re: the generality of RNA to DNA information transfer. I have proposed, page 15 and on in the enclosed manuscript, that this mode of information transfer is more general than just in the RNA tumor viruses, and in fact that the RNA tumor viruses arise from normal elements with this mode of information transfer.

Sincerely yours,

Howard M Temin

Howard M. Temin

HMT:ms
Encl.